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10/025,119	12/19/2001	Ari Hamalainen	3865/OK109	5808

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EXAMINER

BAYARD, EMMANUEL

ART UNIT	PAPER NUMBER
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2631

DATE MAILED: 03/29/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

## Office Action Summary

**Application No.**

10/025,119

**Applicant(s)**

HAMALAINEN, ARI

**Examiner**

Emmanuel Bayard

**Art Unit**

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 19 December 2001.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 1-14 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-14 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some \* c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)  
Paper No(s)/Mail Date 12/19/01.
- 4) ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date. \_\_\_\_\_.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: \_\_\_\_\_.

## **DETAILED ACTION**

### ***Specification***

1. The abstract of the disclosure is objected to because in line 18 delete "fig.2a". Correction is required. See MPEP § 608.01(b).

### ***Claim Rejections - 35 USC § 112***

2. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

3. Claims 1-14 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.
4. Claim 1 recites the limitation "the transmitted symbols" in line 8. There is insufficient antecedent basis for this limitation in the claim.
5. Claim 1 recites the limitation "the bit decisions" in line 8. There is insufficient antecedent basis for this limitation in the claim.
6. Regarding claim 1, the phrase "it" in line 9, renders the claim indefinite because it is unclear as to what "it" is referring to. Applicant is suggested to replace "it" by the proper meaning. Appropriate correction is required.
7. Claim 1 recites the limitation "said defined quantity" in line 9. There is insufficient antecedent basis for this limitation in the claim.
8. Claim 3 recites the limitation "the update rule" in line 3. There is insufficient antecedent basis for this limitation in the claim.

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9. Claim 4 recites the limitation "the update rule" in line 1. There is insufficient antecedent basis for this limitation in the claim.
10. Claim 5 recites the limitation "said defined number" in line 11. There is insufficient antecedent basis for this limitation in the claim.
11. Claim 5 recites the limitation "the transmitted symbols" in line 12. There is insufficient antecedent basis for this limitation in the claim.
12. Claim 7 recites the limitation "the update rule" in line 2. There is insufficient antecedent basis for this limitation in the claim.
13. Claim 9 recites the limitation "the modulation" in line 3. There is insufficient antecedent basis for this limitation in the claim.
14. Claim 11 recites the limitation "the update rule" in line 2. There is insufficient antecedent basis for this limitation in the claim.
15. Claim 13 recites the limitation "said defined number" in line 7. There is insufficient antecedent basis for this limitation in the claim.
16. Claim 13 recites the limitation "the transmitted symbols" in line 8. There is insufficient antecedent basis for this limitation in the claim.
17. Claim 14 recites the limitation "said defined number" in line 11. There is insufficient antecedent basis for this limitation in the claim.
18. Claim 14 recites the limitation "the transmitted symbols" in line 12. There is insufficient antecedent basis for this limitation in the claim.

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Claims 2, 6, 8, 10 and 12 are also rejected because they depend on a base rejected claim.

***Claim Rejections - 35 USC § 102***

19. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this

Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

20. Claims 1-14 are rejected under 35 U.S.C. 102(e) as being anticipated by Molnar U.S. patent No 6,567,481 B1.

As per claims 1, 5, 13 and 14, Molnar teaches a method for performing channel equalization in a receiver (see figs. 8, 9 element 71) in which a signal is received from a communication channel (see fig.8 element 55 and abstract and col.3, lines 10-25), the signal containing symbols formed of binary information by phase shift keying (see col.7, lines 18-20), channel estimation is performed to estimate the properties of the communication channel (see fig.9 element 81 and col.3, lines 56-60 and col.8, lines 14-35), and samples are taken of the received signal at intervals (see abstract), wherein in the method, a determined number of samples are examined (see col.8, lines 26-40), a decision step is taken, in which, to find out the transmitted symbols, the bit decisions are computed (see fig.9 element 91 and col.8, line 17 and col.9, lines 48-55) on the basis of said defined

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quantity of samples, and after each decision step it is examined whether said decision step is to be iterated, wherein upon iteration of said decision step, at least some of the bit decisions of the previous decision step are used in addition to the samples under examination, in the computation of the bit decision (see fig.9 and col.8, lines 35-67 and col.9, lines 8-55) .

As per claims 2 and 6, Molnar does teach a viterbi algorithm for performing said decision step (see col.1, lines 55-60 and col.2, lines 55-60 and col.5, lines 6-60) that is functionally equivalent to the claimed (cost function). Furthermore a cost function which is defined as  $f(B) = \sum_{t=0}^{T-1} |r_t - \sum_{s=0}^{H-1} h_{t-s} S(B_{t-s})|^2$ , in which  $S(B)$  is the symbol corresponding to bits  $B$ ,  $h_{t-s}$  are the estimated channel coefficients, and  $r$  is the received signal which is sampled, and that said cost function is subjected to minimization is inherently taught by Molnar.

As per claims 3 and 7, Molnar does teach an update rule (see col.7, lines 4-8). Furthermore an update rule which is defined as  $l, k(j+1) = f_h(t = l + H - 1, \{r_t - \sum_{l=1}^M S(B_{t-l}) b_{l,k}\} - \{h_{t-l} S(B_{t-l}) b_{l,k}\})$ , is used, where  $B_{t-l}$  is  $M$  bits at the moment  $t-l$ ,  $S(B_{t-l})$  is the corresponding symbol,  $\frac{\partial}{\partial b_{l,k}} |r_t - \sum_{l=1}^M S(B_{t-l}) b_{l,k}|^2$  is a derivative with respect to  $k$  bits,  $h$  indicates the communication channel, of which  $H$  channel taps are estimated, and  $f_h(x)$  is a hard limit function which receives the value 1, if  $x > 0$ , else 0 is inherently taught by Molnar

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As per claim 4, Molnar inherently teaches wherein in the update rule, noise is added before taking said decision step.

As per claim 8, Molnar does teach comprising computing units, each of which are arranged to determine one symbol value on the basis of said defined number of samples, and the output of each computing unit is coupled to the input of at least one other computing unit, for using the symbol values defined by the computing units in the next computation of the bit decision (see col.6, lines 64-67 and col.7, lines 1-10 and col.8, lines 63-67 and col.9, lines 23-40).

As per claim 9, Molnar does teach wherein each computing unit contains as many iteration blocks as the bit number of symbols formed in the modulation (see col.6, lines 64-67 and col.7, lines 1-10 and col.8, lines 63-67 and col.9, lines 23-40) .

As per claim 10, Molnar inherently teaches wherein the means for examining the number of samples determined each time comprise (delay line) (see fig in which the number of delays is one less than the number of symbols to be determined from said defined number of samples.

As per claim 11, Molnar inherently teaches comprising means for adding noise in the update rule before computing said bit decisions.

As per claim 12, Molnar teaches comprising means for setting an initial value (see abstract) for the bits before computing said bit decisions.

### ***Conclusion***

21. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

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Webb U.S. Patent No 5,483,557 teaches channel equalization.

Luschi et al U.S. patent No 6,539,067 B1 teaches channel estimation.

Hui et al U.S. Patent No 6,674,820 B1 teaches receiver devices.

Shen U.S. patent No 6,327,302 B1 teaches a fast adaptive equalizer.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Emmanuel Bayard whose telephone number is 571 272 3016. The examiner can normally be reached on Monday-Friday (7:Am-4:30PM) Alternate Friday off.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Mohammed Ghayour can be reached on 571 272 3021. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Emmanuel Bayard  
Primary Examiner  
Art Unit 2631

**EMMANUEL BAYARD**  
**PRIMARY EXAMINER**

